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GB 1372174

GB 1004181

US 3508509

GB 1188744

Jane's Ocean Technology 1976-77, Macdonald and  
Jane's Publishers Ltd, pages 166-167.

(58) Field of search

B7A

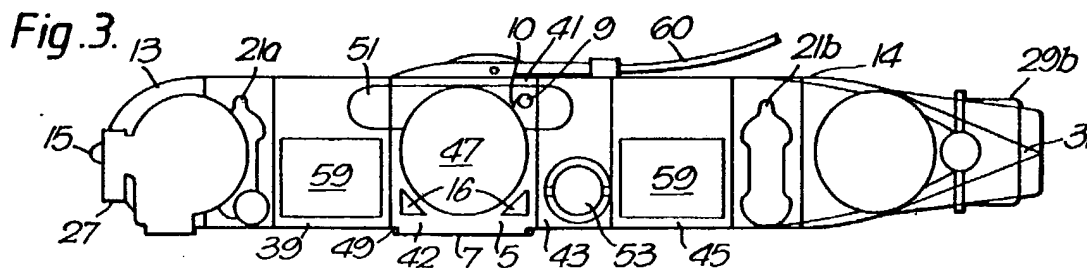
Selected US specifications from IPC sub-classes B63B  
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## (54) Subsea vehicles

(57) A remotely controlled subsea vehicle has a compartment 42 closed by a hinged door 7 from which an article 47 contained in the compartment 42 may be released when required. The vehicle may include a winch 9 for lowering the article 47 when released and retention means securing the article 47 in the compartment.

The vehicle is preferably provided with buoyancy means 51 releasable at the same time as the article 47 to minimise disturbance to the vehicle.

The vehicle is particularly useful for carrying an explosive charge which may be released to destroy a sea mine.



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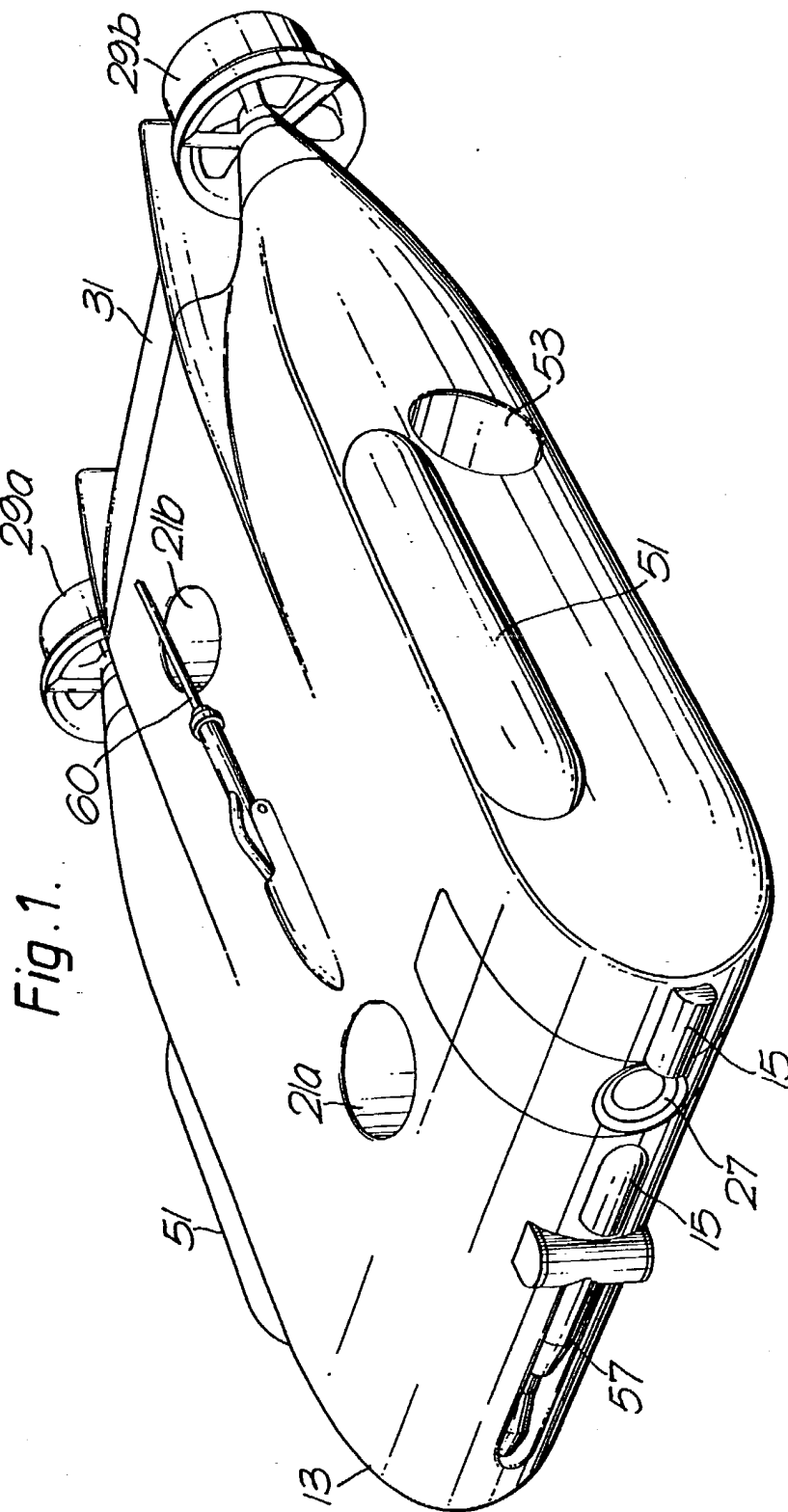


Fig. 2.

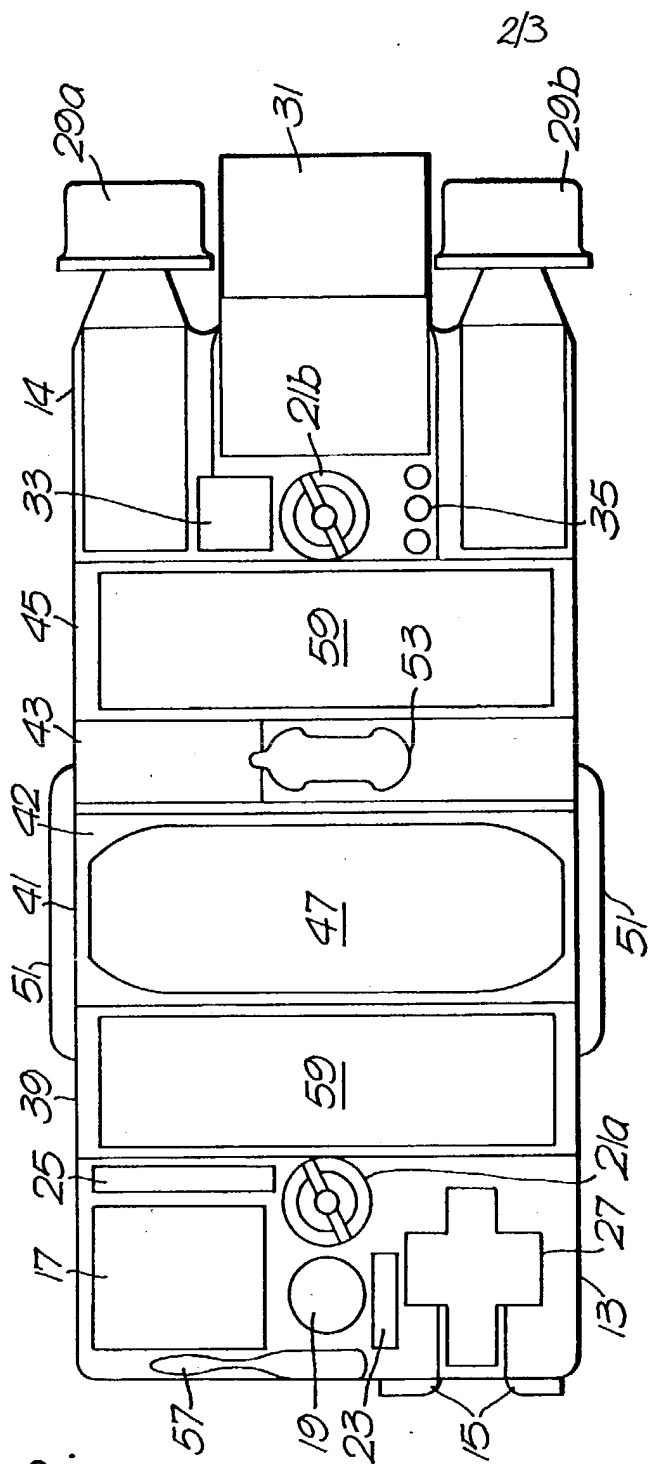


Fig. 3.

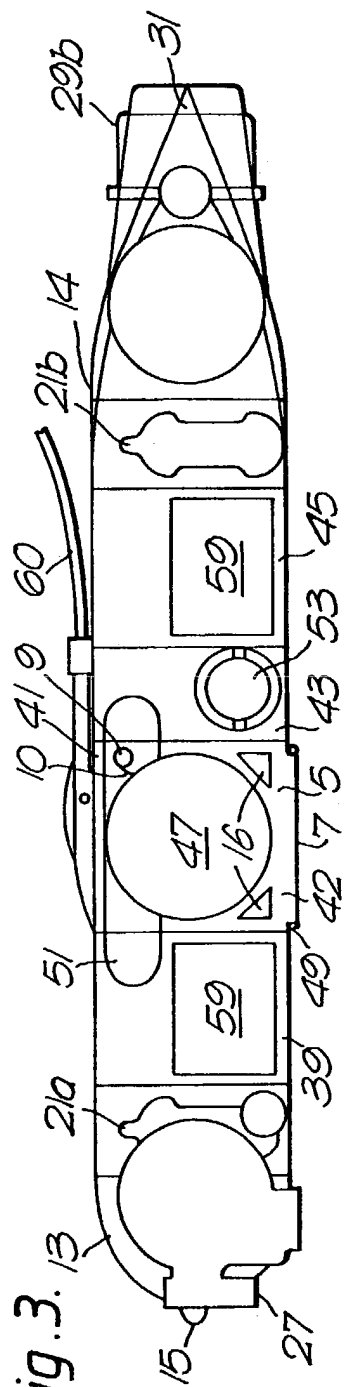


Fig. 4.

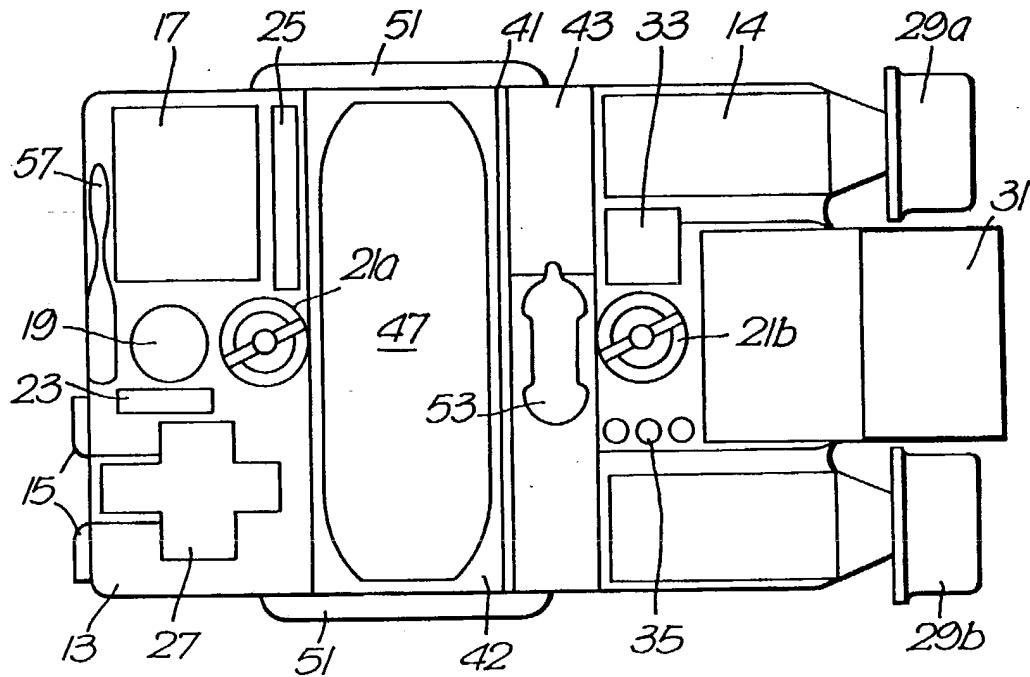
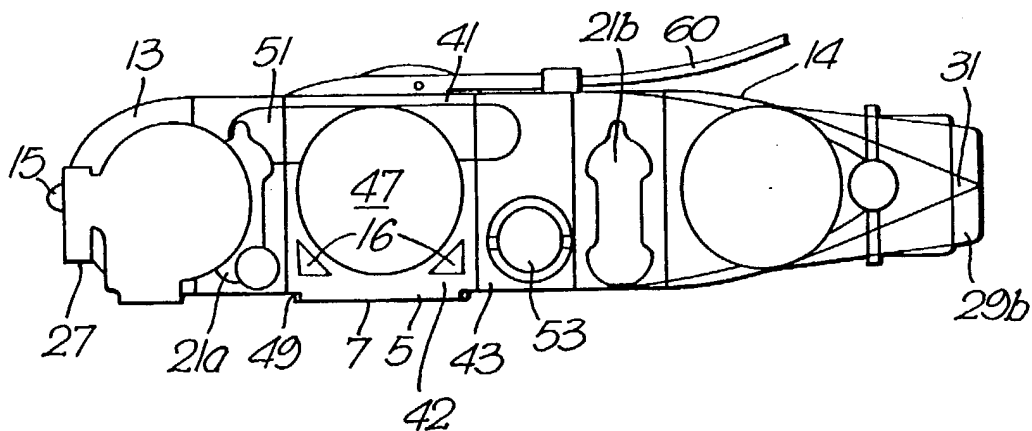


Fig. 5.



## SPECIFICATION

## Subsea vehicles

5 This invention relates to subsea vehicles.

It is an object of the present invention to provide a subsea vehicle suitable for use in the disposal of sea mines.

According to the present invention a remotely operated subsea vehicle includes: a compartment for occupation by a stores item, a wall of which compartment has an aperture; and barrier means movable between a first position in which said aperture is closed and a second position in which said aperture is open so that said stores item may be dispensed from said vehicle.

The vehicle may also further include retention means for holding said stores item within said compartment, said retention means being operative to release said stores item when said barrier means is in said second position.

Preferably the vehicle includes winch and hawser means adapted to feed said stores item through said aperture when said barrier means is in said second position for release at a determined position.

Preferably also the vehicle includes buoyancy means arranged to be released on dispensation of said stores item from said vehicle so as to minimise disturbance to the vehicle on dispensation.

Preferably the centre of gravity and centre of buoyancy of the vehicle are within the volume occupied by the stores item.

The vehicle may be used, for example, in sea mine disposal. For such use the stores item is an explosive charge.

One subsea vehicle according to the invention will now be described, by way of example with reference to the accompanying drawings of which:

Figure 1 is a perspective view of the vehicle;

Figures 2 and 3 are diagrammatic plan and side views of the vehicle, and

Figures 4 and 5 are diagrammatic plan and side views of a modified form of the vehicle.

Referring to Figures 1, 2 and 3, the vehicle has a stress bearing structure comprising a streamlined nose module 13, a rear module 14 and interposed between these two modules, four intermediate modules 39, 41, 43 and 45. The modules are releasibly secured to one another by bolt fastenings (not shown).

The nose module 13 incorporates an articulator 57, an articulator winch 23, an articulator pod 25, an electronics pod 17, a sonar 19, lights 15, a television camera 27 and a vertical thruster 21a.

The rear module 14 incorporates two laterally spaced axial drive thrusters 29a, 29b, a hydrodynamic control surface 31 for controlling the vehicle in pitch, sonar electronics 33 and ping transducers 35. The rear module

14 further incorporates a second vertical thruster 21b.

The intermediate module 43 houses a lateral thruster 53.

The vehicle is linked to a command vessel by means of an umbilical cable 60 comprising a data transmission line connected to module 41.

In an alternative arrangement (not shown) the data transmission line may be connected to the rear module 14 of the vehicle.

The module 41 includes a chamber 42 extending lengthwise transverse the vehicle and within which a sea mine disposal charge 47 may be carried, attached to a hawser 10. The bottom wall 49 of the module 41 has an aperture 5 which also extends lengthwise transverse the vehicle and has dimensions such that free passage of the charge 47 through the aperture 5 may occur. The aperture 5 is closeable by barrier means in the form of a door 7 hinged at one edge to an edge of the aperture 5 and latched at another edge to another edge of the aperture 5. The module 41 further includes charge buoyancy members 51 and a winch 9 whereby the hawser 10 may be played out through the aperture 5, and retension means 16 whereby the charge 47 is secured in position within the chamber 42.

In operation the vehicle is directed towards a sea mine by means of signals passing between the command vessel and the vehicle via the data transmission line 60. Signals controlling the vertical thrusters 21a, 21b, the axial drive thrusters 29a, 29b the thruster 53 and the hydrodynamic control surface 31 pass from the command vessel to the vehicle and signals output by the television camera 27 and the sonar 19 pass in the reverse direction. The lights 15 are used to illuminate the view shown by the camera 27.

Once the vehicle has reached a position close to the mine, the door 7 is opened, the retention means 16 is operated to free the sea mine disposal charge 47 and the winch 9 operated to play out the hawser 10 to which the sea mine disposal charge 47 is attached and deposit the charge 47 on the sea bed adjacent the mine. The accurate deposition of the charge 47 is ensured by constant surveillance of this deposition by the camera 27. At the instant the charge 47 is released from the vehicle, i.e. at the instant the vehicle is no longer influenced by the weight of the charge 47, the charge buoyancy members 51 are also freed. By this means disturbance to the vehicle consequent on the release of the charge 47 is minimised and the surveillance of the deposition of the charge 47 is not significantly affected. To ensure stability and the trim of the vehicle after the release of the charge 47 the centre of gravity of the vehicle is arranged to be within the volume occupied by the charge 47 when carried in the module

41.

Destruction of the mine is of course effected by subsequent detonation of the deposited charge 47.

- 5 The articulator 57 is employed in connecting cutting charges to the hawsers of moored mines.

- Referring now to Figures 4 and 5, in a modification of the vehicle the intermediate modules 39,45 containing the battery packs 59 are omitted. In this case the power for the vehicle is provided from the command vessel by means of the umbilical cable 60 which now comprises a power line and a data transmission line, rather than only a data transmission line.

- In addition the hawser 10, to which the charge 47 is attached and winch 9 are omitted, the dispensing of the charge 47 being carried out simply by release of the charge 47 for free fall through the aperture 5 onto the sea bed adjacent the mine to be destroyed.

- In further alternative arrangements according to the invention the aperture through which the charge is dispensed may be closed by a pair of doors respectively hinged at one of their edges to opposite edges of the aperture and latchable at their front edges. Alternatively, the aperture may be closed by a door which slides in a guide over the face of the aperture.

#### CLAIMS

1. A remotely operated subsea vehicle including a compartment for occupation by a stores item, a wall of which compartment has an aperture; and barrier means movable between a first position in which said aperture is closed and a second position in which said aperture is open so that said stores item may be dispensed from said vehicle.

2. A vehicle according to Claim 1 further including retention means for holding said stores item within said compartment, said retention means being operative to release said stores item when said barrier means is in said second position.

3. A vehicle according to Claim 1 or Claim 2 further including winch and hawser means adapted to feed said stores item through said aperture when said barrier means is in said second position for release at a determined position.

4. A vehicle according to any one of Claims 1, 2 and 3 further including buoyancy means arranged to be released on dispensation of said stores item from said vehicle so as to minimise disturbance to the vehicle on dispensation.

5. A vehicle according to any one of the preceding claims wherein the centre of gravity and centre of buoyancy of said vehicle are within the volume occupied by said stores item.

6. A vehicle according to any one of the

preceding claims wherein said stores item is an explosive charge suitable for use in the destruction of an underwater feature.

7. A vehicle according to Claim 6 wherein said underwater feature is a sea mine.

8. A remotely operated subsea vehicle substantially as hereinbefore described with reference to Figures 1, 2 and 3 of the accompanying drawings.

9. A remotely operated subsea vehicle substantially as hereinbefore described with reference to Figures 1, 4 and 5 of the accompanying drawings.

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